

# National Hospital Care Survey Demonstration Projects: Traumatic Brain Injury

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# NHCS Background

The National Hospital Care Survey (NHCS) integrates three long-standing surveys:

- NHDS - the longest continuously fielded sample of inpatient care from 1965-2010
- NHAMCS - surveying hospital EDs and OPDs since 1992, hospital ASLs since 2009, and freestanding ASCs since 2010
- DAWN - collected data on drug-involved ED visits since 1970s; conducted by SAMHSA from 1992-2011

# NHCS Goal and Objectives

## Goal:

- Provide reliable and timely healthcare utilization data for hospital-based settings.

## Objectives:

- Move toward collection of electronic health record data.
- Continue to make available health statistics previously provided.
- Link episodes of care across hospital units as well as link to other data sources such as the National Death Index and Medicare data.

# Purpose of Demonstration Projects

## Highlight new data items

- Diagnostic and therapeutic services
- Intensive care unit stays

## Study rare conditions

- All inpatient and ambulatory visits over 12 month period collected

## Demonstrate new analytical capabilities with the collection of personally identifiable information (PII)

- Inpatient re-admissions within year and across years
- Inpatients who visited ED within 24-72 hours
- Repeat ED visits
- Link care delivered ED, inpatient and/or OPD
- Evaluate 30, 60 or 90-day mortality

# First Topic Area

## Traumatic Brain Injury (TBI):

- Disruption of normal brain function caused by a blow to the head or a penetrating head injury.
- Severity may range from “mild” (brief change in mental status or consciousness) to “severe” (an extended period of unconsciousness or amnesia after the injury).
- According to the NHDS, NHAMCS, and the National Vital Statistics System, an estimated 1.7 million people suffer from TBI annually, 52,000 of whom die.

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## National Hospital Care Survey Demonstration Projects: Traumatic Brain Injury

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### Abstract

**Purpose**—This report demonstrates the analytical potential of the National Hospital Care Survey (NHCS) through a case study of inpatient discharges and ambulatory visits for traumatic brain injury (TBI) based on unweighted data from the 2013 NHCS of inpatient and emergency department (ED) encounters and the 2013 and 2014 NHCS for outpatient department (OPD) encounters.

**Methods**—For the 2013 NHCS data collection, 97 hospitals provided inpatient administrative claims data and 88 hospitals provided ambulatory claims data. Although the data are not intended to be nationally representative, the survey provides unique opportunities to study rare but serious conditions, such as TBI, because all inpatient discharges and ambulatory encounters from participating hospitals are collected for a 12-month period. Analyses were conducted to study TBI encounters in and across the inpatient, ED, and OPD settings. Differences among subgroups were evaluated using a chi-squared 2-sample test for equality of proportions at the 0.05 level.

**Results**—Analyses were conducted to examine TBI encounters across various hospital settings and highlight the tremendous analytical capabilities of NHCS, capabilities that have not been available before in previous surveys. New data elements such as intensive care use and diagnostic and physical services received, and the ability to link individuals in NHCS across hospital settings are used in the analyses.

**Keywords:** traumatic brain injury (TBI) • health care • National Hospital Care Survey

### Introduction

Traumatic brain injury (TBI) is a disruption of normal brain function caused by a blow to the head or a penetrating head injury. The severity of TBI may range from “mild” (i.e., a brief change in mental status or consciousness) to “severe” (i.e., an extended period of

unconsciousness or amnesia after the injury) (1,2). TBI is a serious health problem in the United States, contributing to a substantial number of deaths and cases of permanent disability each year. According to data from the National Hospital Discharge Survey, the National Hospital Ambulatory Care Survey, and the National Vital Statistics System, an

estimated 1.7 million people suffer from TBI annually, 52,000 of whom die (2).

Data from only inpatient hospitalizations likely underreport the occurrence of TBI because most TBIs are mild and those patients are not admitted to the hospital (3). Therefore, the analysis of TBI in both hospital inpatient and ambulatory settings is a helpful indicator for measuring the incidence of TBI in the United States. Nearly 80% of individuals sustaining TBI seek treatment in emergency departments (ED) and 275,000 are hospitalized annually (2). Studies have found sex and age differences in TBI cases, with males, young children, and older adults at high risk of TBI (2,4,5). The National Hospital Care Survey (NHCS) presents unique opportunities to study how TBI is diagnosed and treated, as well as the continuum of care for TBI patients in U.S. hospitals. Patient identifiers allow for the linkage of patient records across settings, and the collection of data on services received (such as intensive care unit use and diagnostic and therapeutic services) allows for analysis of hospital utilization. This report analyzes inpatient and ED data on TBI from the 2013 NHCS data collection and outpatient department (OPD) data from the 2013 and 2014 NHCS data collections to



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# Methods

Sample: 581 noninstitutional, nonfederal hospitals with six or more staffed inpatient beds

Data: UB-04 administrative claims data for all inpatient, emergency department (ED), and outpatient department (OPD) encounters

Respondents in 2013:

- 97 hospitals provided inpatient data
  - ~1.5 million records
- 88 hospitals provided ambulatory data
  - ~3.8 million ED records
  - ~15.1 million OPD records

# TBI Encounters in 2013 NHCS

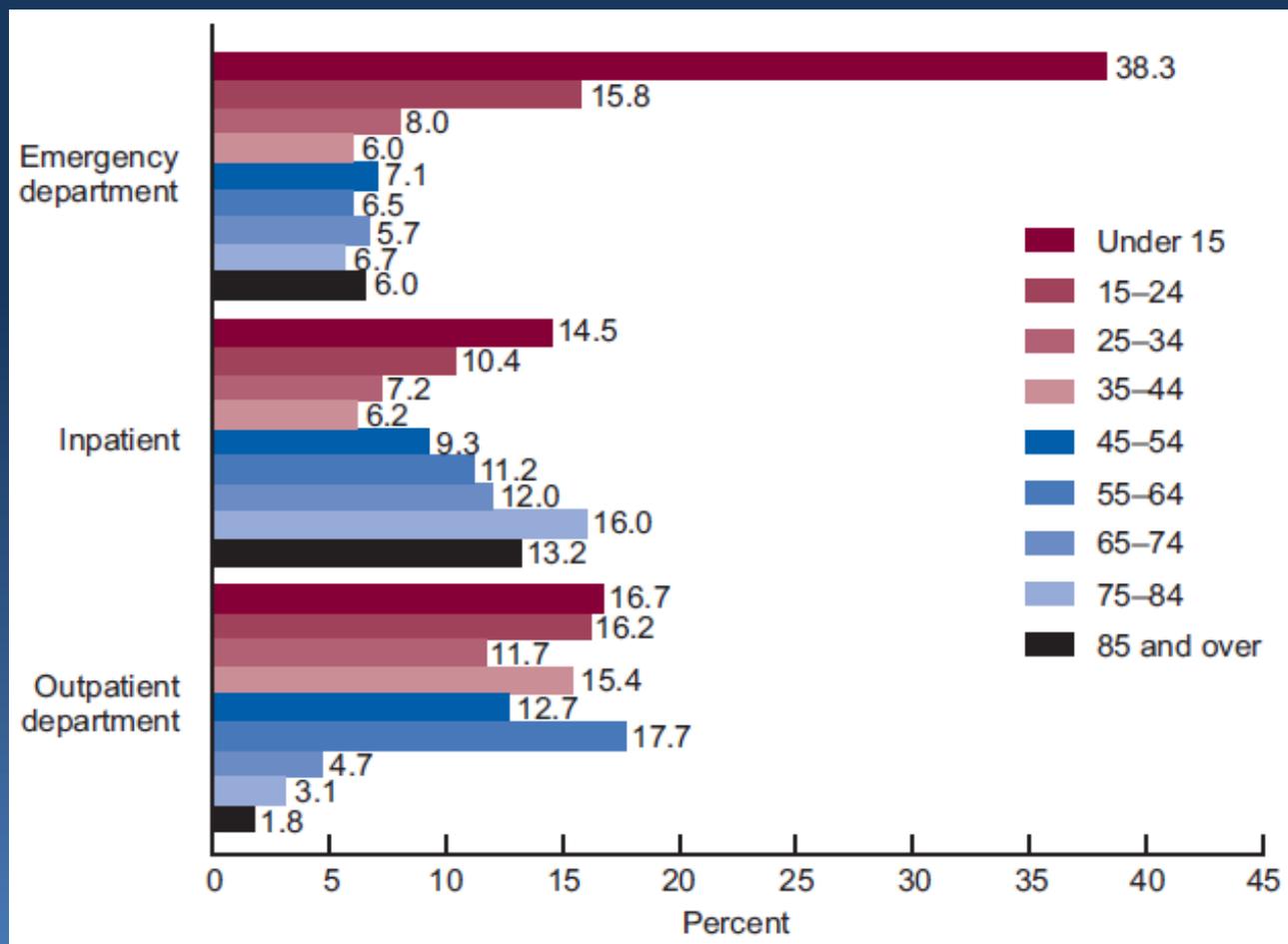
First-listed diagnosis of TBI (unweighted):

- 11,473 inpatient discharges
- 62,806 ED visits
- 36,112 OPD visits

Number of encounters far exceeds the data previously collected in NHDS and NHAMCS.

# Results

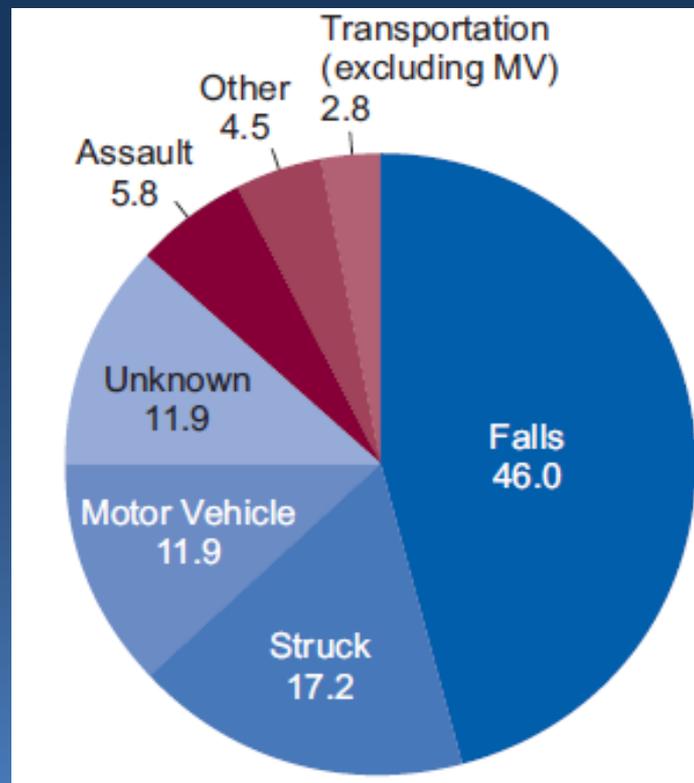
# Age distribution of first-listed diagnosis of TBI in ED, inpatient, and OPD settings: unweighted NHCS 2013



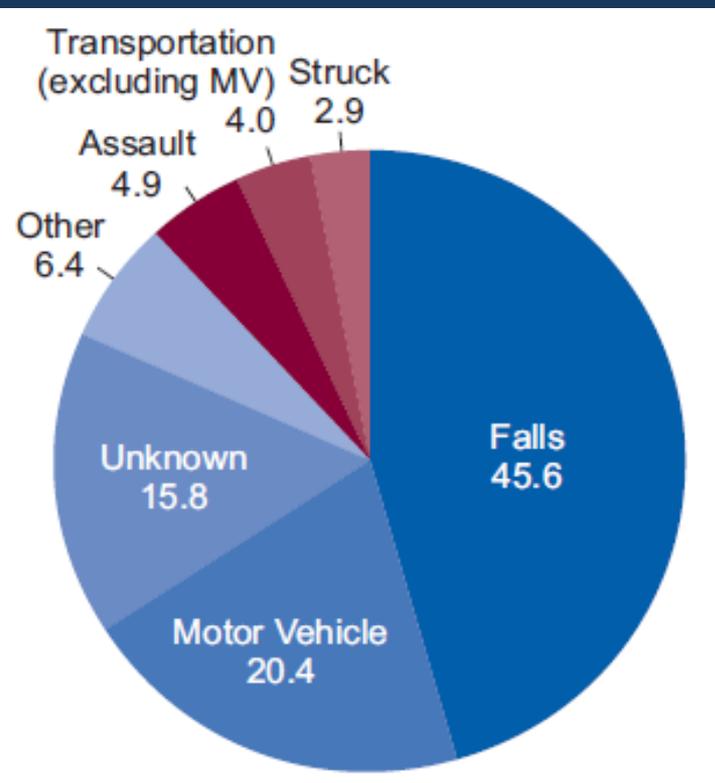
NOTES: Emergency department: n = 62,806; inpatient: n = 11,473; outpatient department: n = 36,112.  
SOURCE: NCHS, National Hospital Care Survey, 2013.

# Percent distribution of external cause of injuries with a first-listed diagnosis of TBI, by setting: unweighted NHCS 2013

## Emergency department



## Inpatient



NOTES: MV is motor vehicle. Emergency department: n = 62,806; inpatient: n = 11,473.  
SOURCE: NCHS, National Hospital Care Survey, 2013.

# Percent distribution of external cause of injury for first-listed diagnosis of TBI, by documented alcohol and drug abuse and setting: unweighted NHCS 2013

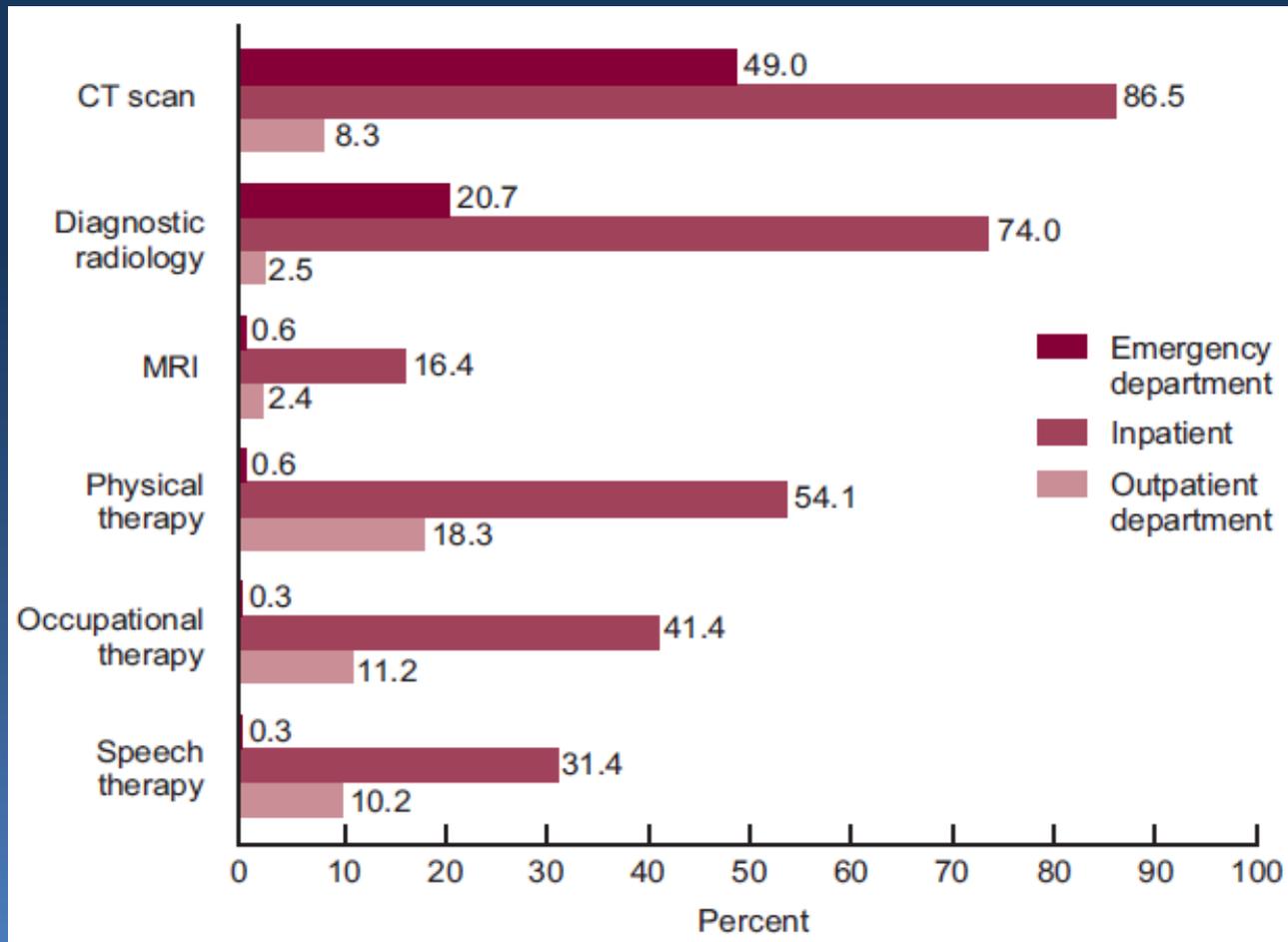
External cause	Emergency Department				Inpatient			
	Alcohol abuse only\1	Acute alcoholic intoxication	Drug abuse only	Concurrent alcohol and drug abuse\1	Alcohol abuse only\1	Acute alcoholic intoxication	Drug abuse only	Concurrent alcohol and drug abuse\1
Total	3.5	0.9	0.4	0.4	10.0	2.6	1.3	1.7
Motor Vehicle	5.7	1.9	---	0.7	11.6	4.3	---	2.1
Falls	3.3	0.5	0.4	0.3	9.4	1.1	1.4	1.0
Assault	9.8	2.6	1.0	1.4	21.0	6.3	---	6.1
Struck	0.4	---	---	---	---	---	---	---
Transportation (excluding MV)	5.1	---	---	---	12.0	---	---	---
Other	4.7	1.5	1.1	---	6.8	4.2	---	---
Unknown	2.8	1.3	---	0.5	8.7	3.5	---	2.3

--- Data not available due to sample size less than 30.

\1Excludes ICD-9-CM 303.0 (acute alcoholic intoxication).

NOTE: Categories are mutually exclusive.

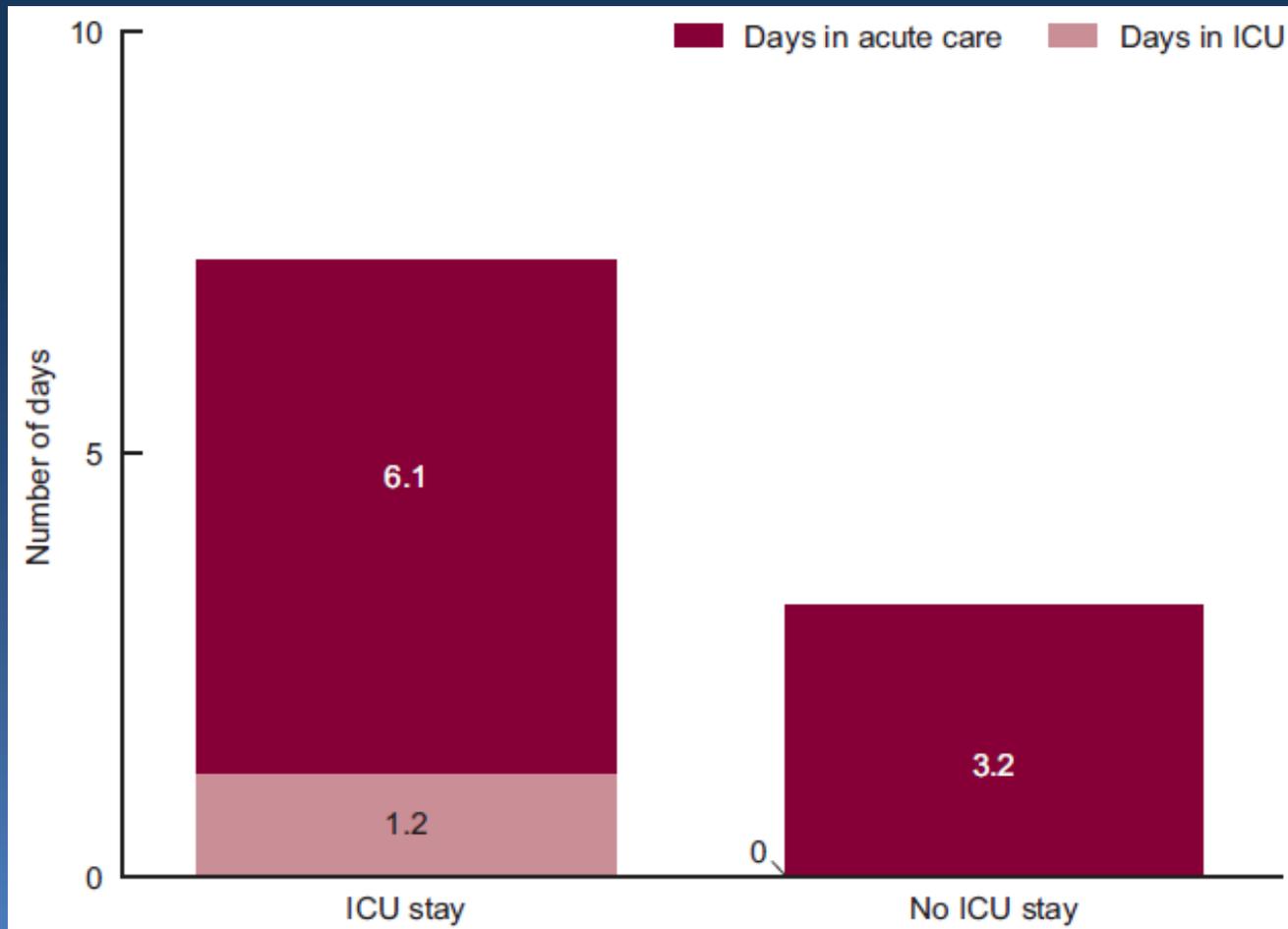
# Percentage of first-listed diagnosis of TBI encounters receiving diagnostic and therapeutic services in ED, inpatient, and OPD settings: unweighted NHCS 2013



NOTES: CT is computed tomography. MRI is magnetic resonance imaging. Emergency department: n = 62,806; inpatient: n = 11,473; outpatient department: n = 36,112.

SOURCE: NCHS, National Hospital Care Survey, 2013.

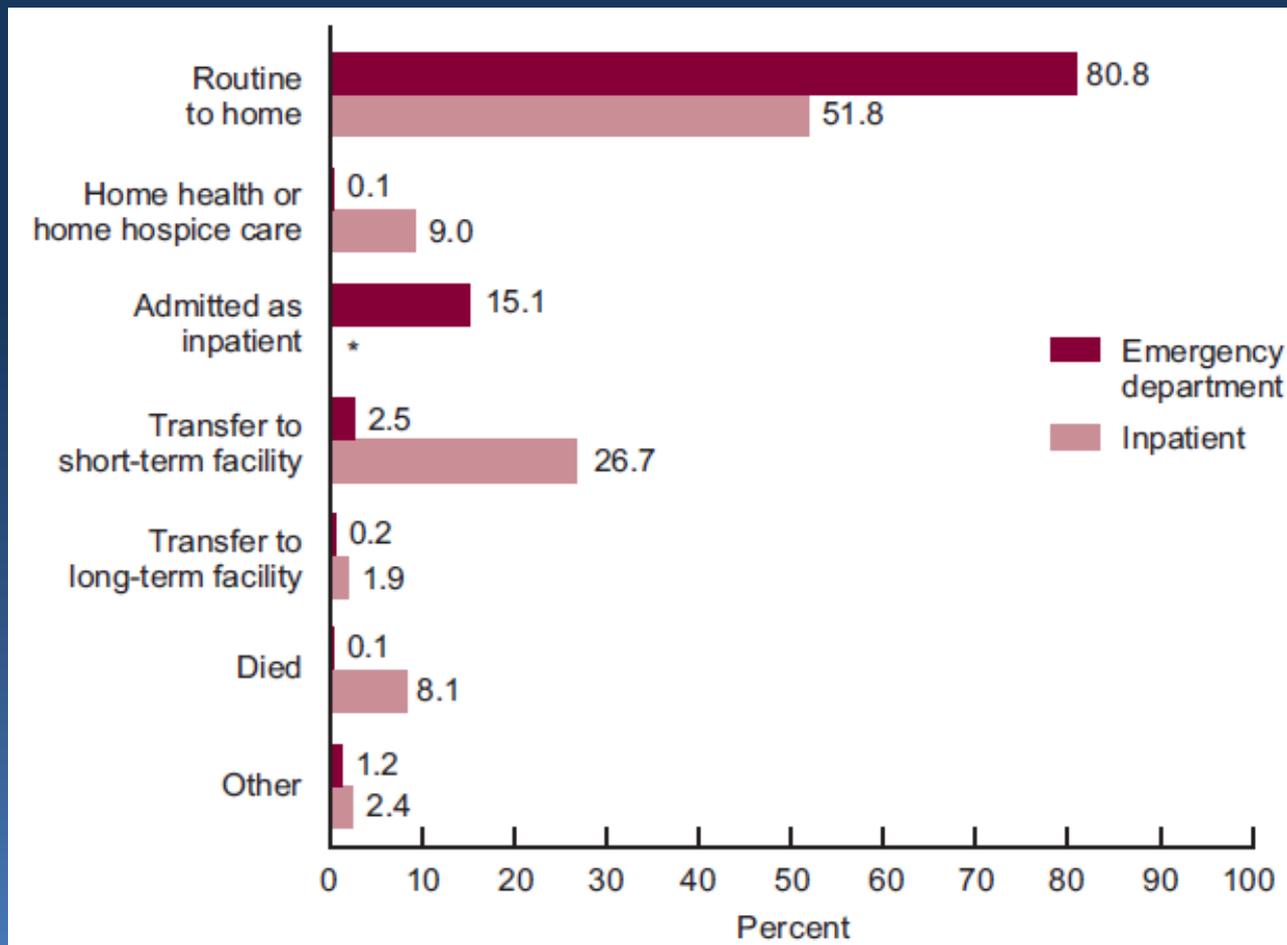
# Average length of stay for inpatients hospitalized with a first-listed diagnosis of TBI, by ICU status: unweighted NHCS 2013



NOTES: ICU is intensive care unit. Inpatient: n = 11,473.

SOURCE: NCHS, National Hospital Care Survey, 2013.

# Discharge status for first-listed diagnosis of TBI in the ED and inpatient settings: unweighted NHCS 2013

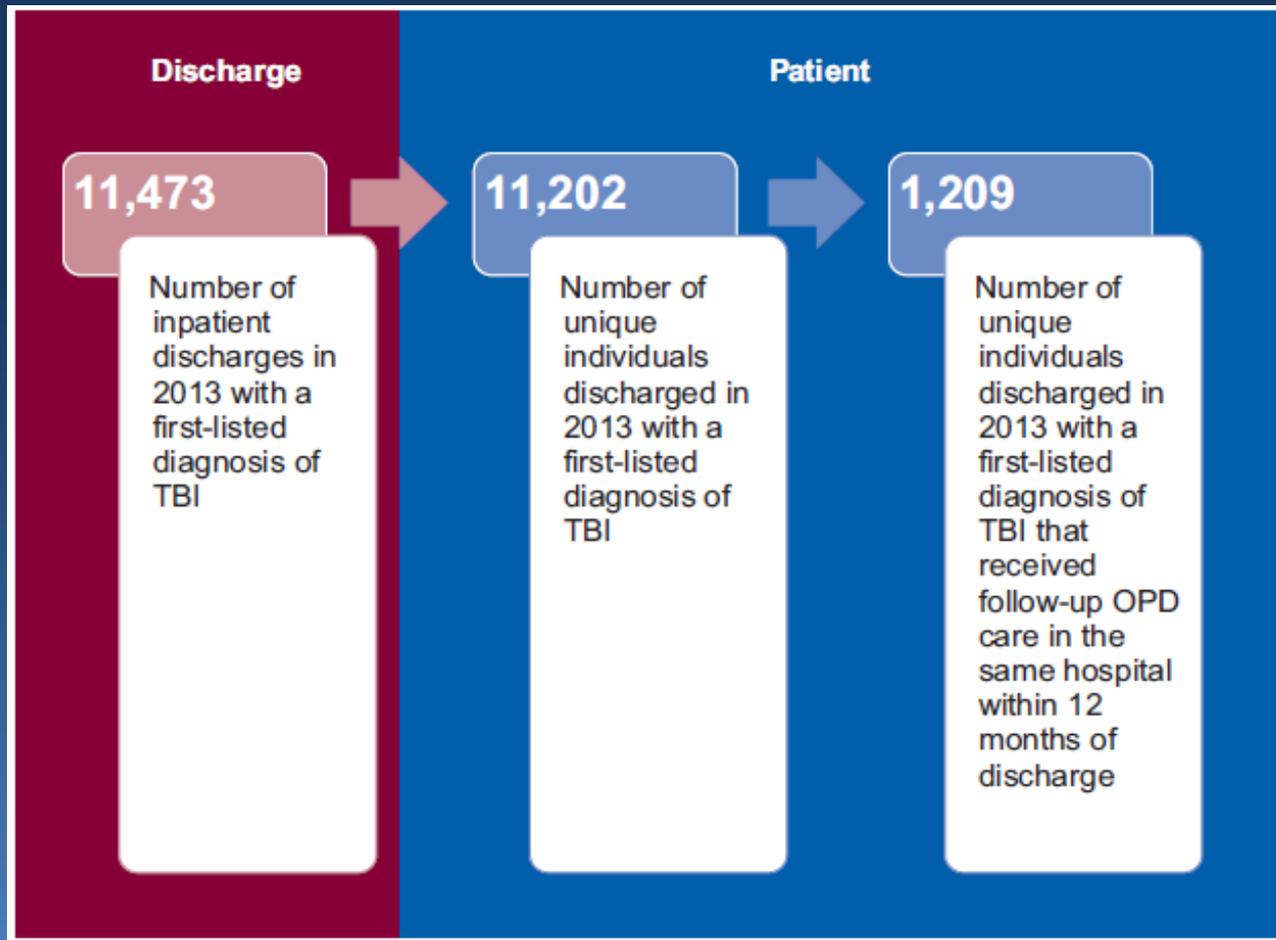


\*Inpatients cannot have a discharge status of "admitted as inpatient."

NOTES: Emergency department: n = 62,806; inpatient: n = 11,473.

SOURCE: NCHS, National Hospital Care Survey, 2013.

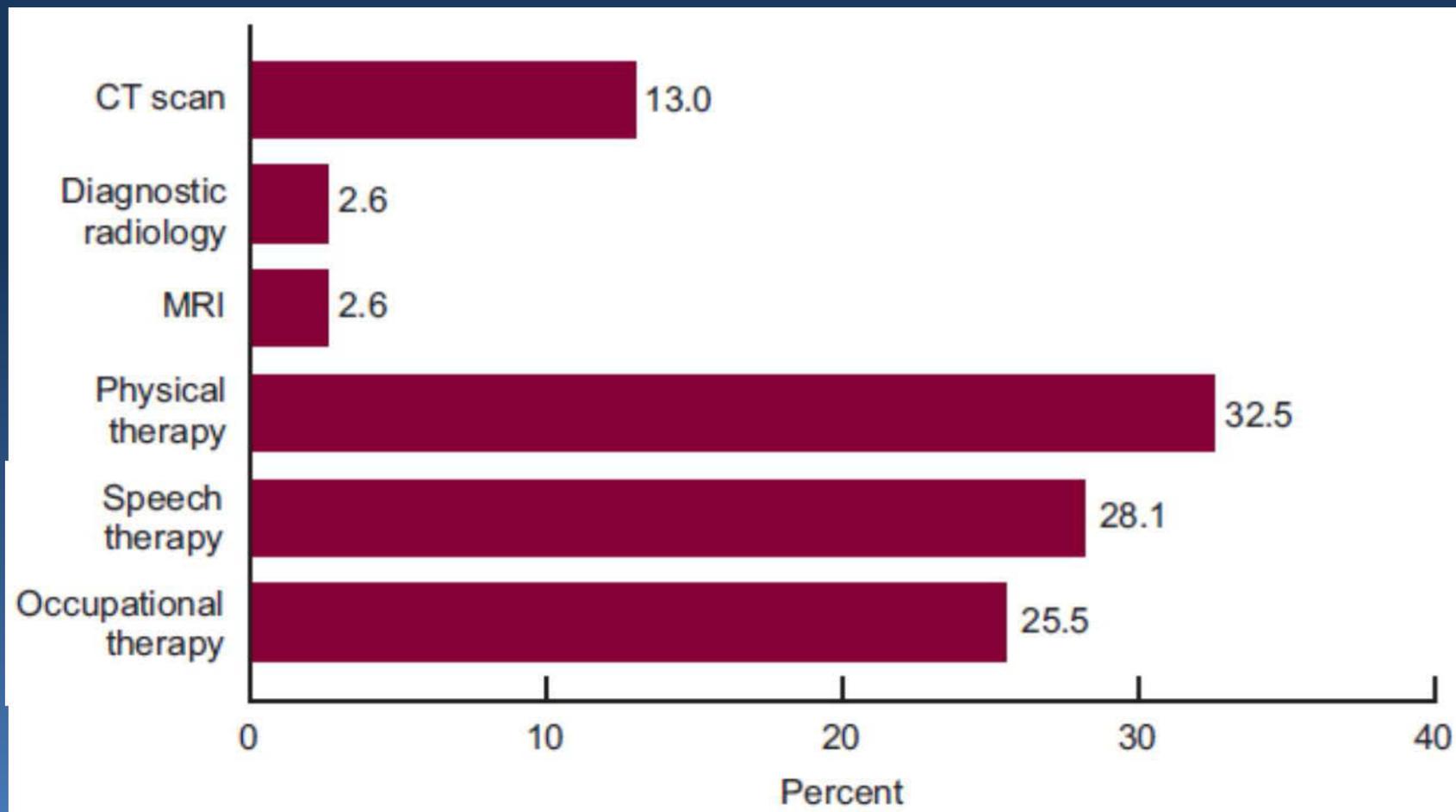
# Flow chart of inpatient discharges for first-listed TBI to follow-up OPD visits for any-listed TBI: unweighted NHCS 2013-2014



NOTES: TBI is traumatic brain injury. OPD is outpatient department.

SOURCE: NCHS, National Hospital Care Survey, 2013.

# Percentage of any-listed TBI follow-up visits receiving diagnostic and therapeutic services in the OPD setting: NHCS unweighted 2013-2014



NOTES: CT is computed tomography. MRI is magnetic resonance imaging. Outpatient department follow-up encounters: n = 3,636.

SOURCE: NCHS, National Hospital Care Survey, 2013-2014.

# Discussion

## Successful demonstration of the potential uses of NHCS data

- Illustrates unique opportunity to study rare conditions.
- Study care and services received including intensive care use, and diagnostic and physical services.
- Ability to link across hospital settings and follow care provided.

# Other Planned Demonstration Project Topics

Pneumonia -- inpatient discharges and emergency department visits for pneumonia using unweighted data from the 2013 NHCS data

- Examine intensive care use among inpatient discharges.
- Study repeat discharges from the hospital and visits to the ED for pneumonia within a 30-day period.
- Evaluate 30-day mortality for discharges and ED visits by linking to the National Death Index (NDI).

# Other Planned Demonstration Project Topics

Opioid abuse -- opioid abuse and poisoning ED visits using unweighted data from the 2013 NHCS

- Evaluate the annual number and type of patients that present to the ED for opioid abuse and poisoning and the type of care they receive.
- Evaluate the frequency of repeat ED visits involving opioid abuse and poisoning within a 6-month period, as well as the characteristics of these patients.

# Thank You!!

The TBI NHSR can be found at:

<http://www.cdc.gov/nchs/data/nhsr/nhsr097.pdf>

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